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River, is a wonderful rocky hammock; one writer calls it "a Paradise of ferns." Here are all the rock-loving ferns of the West Coast that can be found in this latitude, among them the rare creeping fern with so many different names of which the most recent is *Goniopteris reptans*. It has two sorts of fronds, one erect and stout, the other long and tapering, and bending over to the ground to take root like the well known Walking Leaf of the Northern woods.

Another fern of unusual appearance is the *Tectaria trifoliata*, with fronds 12'-18' long, 6'-12' broad. It has scant resemblance to the usual form of a fern, but the large round sori are very evident and unmistakable.

INVERNESS, FLA.

The Ferns of Greene County, Missouri

PAUL C. STANDLEY

Greene County lies in the southwestern part of Missouri, its western and southern borders being about 55 and 40 miles distant, respectively, from the Kansas and Arkansas borders. It occupies the Missouri summit of that geologically most ancient part of the central Mississippi Valley, the Ozark Uplift. The central and western parts of the county consist chiefly of a nearly level prairie, given over to agricultural uses and now possessing but little of the original forest, while the eastern, northern, and southern parts are composed largely of low, rocky, thinly forested hills. The rocks are chiefly Carboniferous and Ordovician limestones, but sandstone is found occasionally.

The flora of this part of Missouri possesses many features of interest, for this county is one of those several hundreds in the United States which are "peculiar" in being the meeting point for the eastern, western, northern, and southern floras. It is a fact, nevertheless, that the

flora of Greene County does exhibit an interesting mixture of certain eastern, western, and southern elements, as might well be expected from its geographic position. This is not as well shown, however, by the ferns as by the flowering plants; nor do the former include more than one or two particularly interesting species. The phanerogamic flora consists chiefly of typically eastern plants which extend to the Atlantic coast, some of them being here near the western limit of their range, such as *Hydrastis canadensis*, *Caulophyllum thalictroides*, *Bicuculla cucullaria*, *Spiraea alba*, *Micranthes virginensis*, *Rhexia virginica*, *Erigenia bulbosa*, and *Cynoxylum floridum*. Associated with the eastern plants are many that are southern or western in their distribution, like *Callirrhoe digitata*, *Cissus ampelopsis*, *Psoralea pedunculata* and *P. tenuiflora*, *Kneiffia linifolia*, *Megapterium missouriense*, *Mentzelia oligosperma*, *Ambrosia psilostachya*, *Bumelia lycioides*, *Androsace occidentalis*, *Salvia. Pitcheri*, *Evolvulus argenteus*, *Manfreda virginica*, and *Othake callosum*. The region is particularly rich in species of Crataegus.

Twenty-six species of ferns and fern allies are known to grow in the region under discussion, a number in which it will compare favorably with most areas of similar size in the Mississippi Valley. Most of the species have a wide range in the eastern United States, but a few are of less general distribution. Several which are common in the East are rare or local in this part of Missouri. Only one of the species listed, *Filix fragilis*, is found, except perhaps rarely, in the prairie region of Greene County, the others being restricted to the wooded hills and valleys.

In addition to Greene County, the writer has included the region about Graydon Springs, Polk County, only a few miles to the north, a locality of particular interest because of the large exposures of sandstone, resulting in the development of a peculiar flora similar in many

respects to that of the serpentine barrens of Pennsylvania and Maryland. One of the most interesting plants is *Selenia aurea*, a southwestern crucifer of extremely local occurrence. The sandstone deposits here are of comparatively recent formation, marking the course of a large river long since extinct. In the sandstone along the old river-bed one finds many impressions left by trunks and branches of trees, as well as other remnants of vegetation.

In 1904 Mr. S. F. Prince published¹ a list of 17 species of ferns from the vicinity of Marble Cave, Stone County, south of Greene County. All of the species listed except one, *Asplenium Ruta-muraria*, occur in the area here treated.

1. *NOTHOLAENA DEALBATA* (Pursh) Kunze. This is a southwestern species which reaches the northeastern limit of its range in southern Missouri. It is said to occur in Greene County at several places along Sac Creek, but the writer has found it but once, at the Matherly Bluffs along the Sac near the northern edge of the county. Here it grows in a most arid environment, in pockets in the face of magnesian limestone cliffs, exposed to the direct rays of the sun. In very dry weather the fronds shrivel, to expand again when moisture is abundant, much like the resurrection plant of the Southwest. The writer has seen *Notholaena dealbata* growing abundantly in a similar situation in southern New Mexico upon rocks of almost exactly the same appearance. It seems to be confined naturally to clefts of limestone rocks; but in spite of this, one instance in Missouri is known to the writer in which plants were transplanted to ordinary garden soil, on the north side of a house, and continued to thrive for several years.

2. *ADIANTUM PEDATUM* L. Common in many places in damp woods, either along small streams or on northward slopes.

¹ Fern Bulletin 12: 72-77.

3. *ADIANTUM CAPILLUS-VENERIS* L. Collected on cliffs along the James River near the southern boundary and possibly inside the county. This fern apparently is local and certainly most elusive. Although he has botanized in regions where it is known to occur, the writer has never been able to find it growing.

4. *PTERIDIUM AQUILINUM* (L.) Kuhn. Abundant locally, especially in the northern part of the county. It grows usually in rather dry soil in thin scrub-oak woods. The habitat of this species in Missouri and in Maryland appears very different from that in which the subspecies *pubescens* occurs in the Rockies. There the bracken is found in comparatively damp woods, in New Mexico under aspens, but, of course, the actual rainfall in such situations is much lower than in the apparently dry woods of the East.

5. *CHEILANTHES FEEI* Moore. Collected in crevices of dry limestone cliffs near Willard, but said to grow also on sandstone in this part of Missouri.

6. *CHEILANTHES LANOSA* (Michx.) Watt. On sandstone cliffs at Pearl, and at Graydon Springs, Polk County. The species is rather rare in this region.

7. *PELLAEA ATROPURPUREA* (L.) Link. Very common nearly everywhere except on the prairie, frequenting limestone cliffs or very stony, shaded ground. It often occurs in arid situations; the plants are then depauperate and the fronds shriveled. The species is not confined to calcareous soil, for at Graydon Springs it is plentiful on sandstone, in rather moist places.

8. *ASPLENIUM BRADLEYI* D. C. Eaton. There is a specimen of this in the U. S. National Herbarium collected at Cave Spring by Mr. J. W. Blankinship in 1893. The writer has botanized about this locality several times and has searched for this fern, but without success. No doubt it is very rare here, and it is one of the rarest ferns of the Eastern United States. In Gray's

New Manual the range is given as "On rocks, e. N. Y. to Ky., 'Mo.,' and southw." There is no longer reason to question its occurrence in Missouri, for the specimen from Greene County is undoubtedly this species. Presumably it occurs here on limestone, for all the rocks in the vicinity are calcareous.

[*Asplenium pinnatifidum* was reported from this county in Tracy's Check-list of Missouri Plants,¹ but probably the report is based upon an incorrect determination.]

9. *ASPLENIUM PLATYNEURON* (L.) Oakes. One of the most frequent and abundant ferns of the region, occurring in the woods nearly everywhere. It is confined to calcareous soil or rocks, preferring considerable moisture, but is able to grow in comparatively arid situations.

10. *ASPLENIUM PYCNOCARPON* Spreng. In Greene County this fern is not common, but it occurs in a few places in the hilly country along the James River, usually in low damp ravines. In Camden County, Missouri, east of Greene County, it is very abundant in places, especially in the limestone sinks so characteristic of that region. The writer has seen it there densely covering areas of an acre or more in extent to the exclusion of nearly all other vegetation.

11. *ASPLENIUM RESILIENS* Kunze. This is one of the rarest ferns of the region and the writer has found it in only a single locality, along the Sac a few miles northwest of Springfield, where it grows in deep shade in recesses of the northward slope of a low bank, the individuals being rather numerous. In the writer's mind this plant is associated with mosquitoes, for these shaded banks are infested with swarms of them, which add little to the pleasure of fern collecting in this particular locality! Another rare plant of the immediate vicinity is *Caulophyllum thalictroides*.

¹ P. 104.

12. *ASPLENIUM TRICHOMANES* L. According to notes by Mr. Blankinship this is found in a few places along the James River. The writer has never found it and has seen no specimens. It may be that the material so identified is really *A. resiliens*.

13. *ATHYRIUM FILIX-FOEMINA* (L.) Roth. The lady fern has been collected only at Pearl, probably in sandstone soil. Specimens in the Drury College herbarium at Springfield were gathered here by Mr. Blankinship in July, 1889.

14. *CAMPTOSORUS RHIZOPHYLLUS* (L.) Link. The walking fern is rather local, but often occurs in considerable abundance. It is confined to limestone boulders or cliffs, invariably in moist shaded situations.

15. *POLYSTICHUM ACROSTICHOIDES* (Michx.) Schott. Widely distributed and often abundant in damp shaded places. It is found in both calcareous and sandy soil.

16. *DRYOPTERIS HEXAGONOPTERA* (Michx.) C. Chr. Rather abundant locally. It occurs in many places along the James in damp woods, and the writer has collected it near Strafford, where it grew on a rather dry, steep, stony hillside in thin oak woods.

17. *DRYOPTERIS MARGINALIS* (L.) A. Gray. This has been found in only two localities, at Pearl and at Graydon Springs. It is rare at Pearl, where only a few plants were seen, these on limestone cliffs along a creek. At Graydon Springs it is more plentiful, growing on shaded limestone cliffs.

18. *FILIX FRAGILIS* (L.) Underw. This ubiquitous plant is the commonest fern in this region, as it is in many other parts of the United States. It is seen oftenest on limestone cliffs, but it will grow almost anywhere in damp woods. The writer has seen it growing luxuriantly under plank sidewalks in Springfield. It often persists for a long time after timber has been cleared away, in open fields.

19. *FILIX BULBIFERA* (L.) Underw. Much less abundant than the preceding species, but not rare. It frequents moist, shaded, limestone cliffs, and is one of the associates of *Asplenium resiliens*. The pendent fronds sometimes reach a large size and are very freely bulbiferous.

20. *WOODSIA OBTUSA* (Spreng.) Torr. Rather common on shaded cliffs, frequently associated with *Filix fragilis*. Along the James it grows on limestone, but about Pearl it inhabits sandy soil.

21. *ONOCLEA SENSIBILIS* L. Known only from Pearl and Graydon Springs. In both cases it grows in sandy soil in thin woods, near the edge of small streams. At one place near Graydon the writer has seen it in a marsh that doubtless is underlain by limestone.

22. *OSMUNDA CINNAMOMEA* L. Apparently this species is confined to sandy soil, and occurs only in the vicinity of Pearl and Graydon Springs. It is found in thin white oak woods or along sandstone cliffs. At Eudora, near Graydon, it is most abundant, the plants often reaching a large size and forming large colonies.

23. *OSMUNDA REGALIS* L. So far the royal fern has been collected only at Graydon Springs, where it grows in a restricted area in sandy soil along the edge of the creek. Conditions at Pearl are almost exactly the same, but while all the other ferns partial to acid soil are found there, this appears to be lacking.

24. *OPHIOGLOSSUM ENGELMANNI* Prantl. Like the more widely dispersed *O. vulgatum* elsewhere, this plant is very local in Greene County. Isolated colonies are found in several places along the Sac north and west of Springfield, and a few very near the city. The writer has found it only in thin, dry oak woods, usually on rather exposed grassy slopes.

25. *BOTRYCHUM VIRGINIANUM* (L.) Sw. Very common in rather damp oak woods in nearly all parts of the region.

26. *EQUISETUM HYEMALE* L. Only this one species of *Equisetum* is known to occur in the county and it is not abundant, being confined to the low ground along the edges of the larger streams like the James and Sac.

U. S. NATIONAL MUSEUM,
WASHINGTON, D. C.

A Collector's List of New Jersey Ferns

MACY CARHART

The following list represents collections made by the writer in the vicinity of Keyport and in other parts of New Jersey. Seventy-nine different forms are included, of which sixteen are in the genera *Equisetum*, *Lycopodium*, *Selaginella* and *Isoetes*, leaving the number of ferns at sixty-three. The list includes all but four of the fifty fern species recorded from New Jersey in Norman Taylor's recently published Flora of the Vicinity of New York and to a certain extent supplements that work, which takes no account of varieties and gives no localities at which the hybrids mentioned have actually been found. One of these hybrids, named here as *Dryopteris Clintoniana* \times *cristata*, has never been regularly described,¹ but the plant is fairly distinct and not difficult to recognize. The plants mentioned in the list are all represented by herbarium specimens.

Polypodium vulgare L.; Keyport, rare; northern parts, common.

Phegopteris polypodioides Fée; Newton, one colony.

“ *hexagonoptera* Fée; Keyport, common.

“ *Dryopteris* (L.) Fée; Newton, Phillipsburg.

Adiantum pedatum L.; Keyport, frequent.

¹ Though mentioned in the Flora of Vermont, Vt. Agr. Exp. Sta., Bull. no. 187, 155. (April, 1915.) C. A. W.